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Immortalized in surgical history for the introduction of “antiseptic wax,” Sir Victor Horsley played a pivotal role in shaping the face of standard neurosurgical practice. His contributions include the first laminectomy for spinal neoplasm, the first carotid ligation for cerebral aneurysm, the curved skin flap, the transcranial approach to the pituitary gland, intradural division of the trigeminal nerve root for trigeminal neuralgia, and surface marking of the cerebral cortex. A tireless scientist, he was a significant player in discovering the cure for myxedema, the eradication of rabies from England, and the invention of the Horsley-Clarke stereotactic frame. As a pathologist, Horsley performed research on bacteria and edema and founded the Journal of Pathology. Horsley’s kindness, humility, and generous spirit endeared him to patients, colleagues, and students. Born to privilege, he was nonetheless dedicated to improving the lot of the common man and directed his efforts toward the suffrage of women, medical reform, and free health care for the working class. Knighted in 1902 for his many contributions to medicine, Sir Victor met an untimely death during World War I from heat stroke at the age of 59. An iconoclast of keen intellect, unlimited energy, and consummate skill, his life and work justify his epitaph as a “pioneer of neurological surgery.”

Key words: Brain tumor, History of neurosurgery, Laminectomy, Victor Horsley

Sir Victor Horsley (1857–1916) (Fig. 1) was a skilled surgeon, dedicated investigator, and tireless social reformer. By demonstrating that operations on the brain and spinal cord could be performed with an acceptable level of morbidity and mortality, Horsley established the practice of neurosurgery as a specialty. This article presents a brief outline of Horsley’s life and highlights his contributions to neurosurgery, scientific research, and social reform.

THE EARLY YEARS

Victor Alexander Haden Horsley was born in Kensington, London, England, on April 14, 1857, the third of seven children. Horsley was named after Queen Victoria because he was born on the same day as her daughter, Princess Beatrice. He grew up in a world of privilege; his father was a well-known artist, and his maternal grandfather was a physician. His early years were spent at Cranbrook, Kent. He was completely ambidextrous, which undoubtedly contributed to his legendary skill in surgery (26, 33, 37).

Horsley matriculated at London University in 1874 and then attended medical school at University College London from 1875 to 1881 (28, 33). At University College Hospital, his teachers included Sir William Gowers and Charlton Bastian; his first article, written with Bastian while Horsley was still a medical undergraduate, was published in Brain in 1880 (1, 28). Horsley, an exceptionally bright student, won gold medals in anatomy and surgery and a silver medal in physiology during his university examinations (25, 26, 33, 37).

HORSLEY AS SURGEON

Horsley was appointed as surgical registrar at University College Hospital in 1882. A year later, he obtained the Fel-
Horsley’s approach to neurological surgery was unique; it was based on the considerable experience and skill he had acquired in the course of experimental animal studies. Such was his fame that when a position was available in 1886 at the National Hospital for the Paralyzed and Epileptic in Queen Square, “the Staff intended to have Horsley and nobody else” (33). He was the one man qualified for the post; by this time, he had performed more than 100 brain operations on primates (31, 33, 37).

Horsley performed his first craniotomy on May 25, 1886, in Queen Square in London. The patient was a 22-year-old man who had experienced posttraumatic Jacksonian status epilepticus. The seizures were caused by a cortical scar, which was excised with a half centimeter of surrounding brain. The wound healed, and the patient had no further seizures (7). By the end of the year, Horsley had performed 10 craniotomies; the outcomes ranged from clinical improvement to complete recovery and were successful in nine cases (8).

The first laminectomy for excision of a spinal tumor was successfully performed by Horsley in 1887 on a 42-year-old man who presented with paraplegia. The diagnosis of spinal tumor was reached by Sir William Gowers, the renowned neurologist. Intraoperatively, an intradural fibromyxoma was found at the level of the third and fourth dorsal roots, and it was completely excised. The patient made a complete recovery (25–27). Cervical spine surgery had been considered particularly hazardous in the 19th century until Horsley’s presentation of seven cases of cervical laminectomy at the Meeting of the British Medical Association in 1895 (13, 25). Of the seven patients, three had been operated on for tuberculosis of the cervical spine and four for cervical spinal trauma. Three patients attended that meeting to attest to their recovery from quadriplegia.

Horsley, an innovative surgeon, had observed from canine skulls that modeling wax was efficacious in stopping bleeding. He developed a mixture of beeswax, salicylic acid, and almond oil in 1886, thus leaving his legacy of “antiseptic wax” (10). He advocated the application of muscle stamps and deep anesthesia for the control of hemostasis (22). The curved skin flap used today owes its origins to Horsley, who introduced it in 1886. Before its introduction, the cruciate skin incision, which impeded both wound closure and healing, was universally used (7, 31, 37). Other “firsts” by Horsley include the first reported carotid ligation for cerebral aneurysm (36), the transcranial approach to the pituitary gland (22), intradural division of the trigeminal nerve root for tic douloureux (22, 39), surface marking of the cerebral cortex (22, 26), and craniectomy for microcephaly (28). A pioneer in the field of epilepsy surgery, Horsley performed cortical stimulation with electrodes (17, 26).

Horsley’s good results were attributed to his *modus operandi*. He created large bony defects during surgery for postoperative decompression (5) and used controlled anesthesia (Fig. 2) (16, 27, 28). The use of staged surgery for large tumors (12) and his customary operative speed (5, 26, 38) resulted in a minimization of blood loss and anesthetic time, which were the leading causes of mortality in that era. Harvey Cushing, who inherited his meticulous technique from William Halsted, was shocked by Horsley’s frenetic pace of surgery (5, 23). Nonetheless, Cushing found much to admire in the Englishman, describing him as “kindness itself” (5), and he proclaimed that “the birth of modern neurological surgery may be properly assumed to have taken place” when Horsley was appointed Staff Surgeon in Queen Square (22).

**HORSLEY AS SCIENTIST**

In 1884, Horsley was appointed Superintendent of the Brown Institution, where he served for 6 years. The Brown Institution was an eminent center for research on the diseases and injuries of animals (23, 27, 28, 33). Horsley undertook the following investigations during this period: cortical localization, the pathology of epilepsy, canine chorea, healing by first intention, the link between thyroid ablation and myxedema, and verification of Louis Pasteur’s antirabies vaccine (23, 26–28, 31, 33, 37, 39). These 6 years saw the appearance of more than 51 publications and represented the most prolific period in Horsley’s scientific career. As a result, Horsley was elected as a Fellow of the Royal Society in 1886 at the tender age of 29 (25, 28, 33).

Horsley had a keen interest in comparative anatomy and spent afternoons in his laboratory. He once gave up his morning consultations to dissect out the brain of a dead walrus at the Zoological Gardens, remarking that “If people want me to learn, they must be willing to wait” (33). His classic monograph *The Structure and Functions of the Brain and Spinal Cord*, published in 1892 (11), reflected the depths of his research talent and consummate knowledge of neurophysiology (22, 25).

The Horsley-Clarke stereotactic frame (Fig. 3) was invented by Robert Henry Clarke, the neurophysiologist with whom Horsley collaborated on studies of cerebellar function (3). This instrument was used for selective stimulation and electrolytic ablation of the deep cerebellar nuclei in animals without interfering with the other parts of the brain (4, 21). The original instrument, constructed in 1905 at a cost of £300, is now...
HORSLEY AS PATHOLOGIST

Horsley worked with Frederick Mott, the neuropathologist, on bacteriology in 1880 and published a paper on the existence of bacteria 2 years later (30). He experimented on xerographic transplantation of tumors and contributed articles on microbiology and edema (20, 28, 33). He was appointed assistant professor of pathology at University College London in 1882 and succeeded his mentor, Charlton Bastian, as professor in 1883. Under his leadership, the department became a recognized center for experimental pathology and attracted researchers from all over the world (2, 28). In 1891, he founded the Journal of Pathology (37), which to this day has continued Horsley’s emphasis on bridging the disciplines of basic science and clinical medicine.

HORSLEY AS SOCIAL REFORMER

The tradition of social reform ran deep in Horsley’s family. His father, who was a celebrated painter in the Royal Academy, denounced the use of the nude form in art schools because of concern for the models (23, 37). Horsley was a staunch believer in women’s rights, and he fought for the admission of women physicians to practice in Queen Square and the recognition of nursing as a profession (33).

Horsley was passionately opposed to the use of tobacco and alcohol, the latter principally owing to the adverse effects on his own concentration that he had observed while a student. His campaign against the “rum ration” issued to the troops during the World War I was not popular among the military and his peers (19). He was elected president of the British Temperance Association in 1896 and coauthored the book Alcohol and the Human Body in 1907 (6, 28, 33).

When the Medical Defence Union was in danger of collapse, Horsley was elected its president and devoted efforts to the Union’s aims of protecting doctors from attacks by unscrupulous people. He served the British Medical Association throughout his adult life, striving to help doctors obtain proper remuneration for their work and engineering medical reforms with regard to death registration, state registration for nurses, and the suppression of quack advertisements (27). He predicted the advantages of the National Insurance Act in
providing better care for the insured and more favorable conditions for the underpaid general practitioner. For this, he was unjustly attacked by opponents within the profession, who were the very ones for whom he was working (26, 28, 33). He served as a direct representative of the General Medical Council from 1897 and took an active part in its reformation (14).

Horsley’s advocacy for medical reform, alcohol abstinence, and the suffragette movement led him to run as a Liberal candidate for the London University seat in Parliament in 1910. Despite many prominent supporters, including William Osler, his unpopular platform led to defeat. In 1911, he did constituency work for the North Islington Liberal and Radical Association. In 1912, he resigned his candidature for North Islington and was adopted by the Liberal Council of the Market Harborough Division. Horsley’s outspoken views on women’s rights led to his resignation a year later. In 1915, the Huddersfield Liberals selected him to run as their candidate. However, Horsley’s political career would be aborted by military service in Egypt that summer (23).

HORSLEY AS SOLDIER

As a youth, Horsley had wished to be a cavalry officer, but as his family could not afford establishing him in this profession, he accepted his father’s suggestion to study medicine instead (6, 33, 37). Horsley and his brother joined the Artists’ Rifles, a volunteer unit, and he was a member until he took his examinations for the Royal College of Surgeons of England (6, 33). He continued to have a keen interest in shooting and persuaded a butcher in 1894 to allow him to shoot several animals with a service rifle. This was followed by a series of publications on the neurophysiology of gunshot wounds to the brain and an analysis of ballistics (6, 15, 18, 33).

At the age of 57, Horsley requested active duty on the Western Front during World War I and was sent to Egypt in June 1915. As the number of cases for elective surgery was limited, his energies were directed largely toward ensuring the adequacy of medical supplies and sanitary conditions for the soldiers (6, 33). When Horsley learned of the breakdown of medical services in Mesopotamia, he volunteered to go there, without consulting his friends or relatives (29). He arrived in Basra on April 16, 1916, and sailed up the river Tigris. He continually telegraphed the Director of Medical Services at Simla, demanding improvements in transport, water supplies, and rations for the troops. Because of increasing public pressure, the British government assumed control from the colonial government, and changes were made in accordance with the principles advocated by Horsley, much to his gratification (6).

Having accomplished much of what he had set out to do, Horsley returned to Amara, planning to leave for India in August. On July 15, 1916, with the shade temperature above 110°F, he walked several miles in the sun to visit a sick officer and returned to camp complaining of a headache. Horsley developed a fever of 104°F and was admitted to the military hospital. As his temperature continued to escalate, he lapsed into coma, and this valiant fighter died a day later, at the age of 59 (6, 22, 24–27, 30, 32, 33, 35, 37, 39). His death was mired in controversy. Although some believed Horsley had succumbed to parathyroid insufficiency, which was endemic at that time, examination of the blood for malaria and hypoparathyroidism was negative, and the cause of death was recorded as heat stroke (6, 23).

EPILOG

Horsley’s accomplishments established him as the leading neurosurgeon of his era and one of the greatest British physicians in history. His courageous optimism kept him persevering in neurosurgery, where the high stakes would have discouraged a lesser man. Despite the pressing demands of a busy practice, he found time for his other passions of scientific research and social reform (37). It has been said that his achievements in science could have been much greater had he not immersed himself in social reform in his later years. But this giant was true to his creed: “. . .The search for knowledge, the dispersal of ignorance, and the righting of wrong in every sphere of life” (26). His achievements in medical science were recognized with knighthood in 1902 (25). Hailed by Osler as the greatest Hunterian surgeon of his day (32), Sir Victor Horsley’s life and work ensured his place in history as the pioneer of our craft (6, 22, 26, 34).

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REFERENCES


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COMMENTS

This is a clearly written and extensive review of the life and work of one of the founders of modern neurosurgery. Sir Victor Horsley was a polymath; he not only contributed to operative neurosurgery in several original ways but also approached the subject with basic experimental surgery in primates and other species. The authors document the many important contributions Horsley made to medicine and other aspects of life in contemporary society (e.g., exclusion of rabies from England and votes for women in political elections). This article brings his achievements to a wide international audience.

David G.T. Thomas
London, England

Tan and Black have written a superb vignette; Victor Horsley has so many qualities that we neurosurgeons would do well to emulate. He embraced the Hunterian approach of laboratory experimental work in tandem with clinical practice. Despite his professional eminence, he showed notable humility combined with a constant striving to do things better and a desire for knowledge. It has been asked (was it by Osler?), why on earth did he venture into the "muddy waters of politics"? Tan and Black give us the clue; he had a profound social conscience, supporting the right of women to vote, the right of women to practice medicine, improved care for patients, better working conditions for all doctors, and opposition to animal experimentation. He was the first to operate on and cure a patient with epilepsy, but it is sadly ironic that his son developed epilepsy. Were Horsley alive now, he would surely be a giant among us lesser mortals. I agree with Tan and Black's statement that Horsley deserves the accolade of "pioneer of neurological surgery." He was, indeed, a neurosurgical giant of the 19th century.

Christopher B.T. Adams
Oxford, England

Sir Victor Horsley is certainly one of the British pioneers in the history of neurological surgery. His attention to detail, innovations in the operating room, and the use of cerebral localization led to remarkable advances in the development of our profession. In addition to these contributions, the man was a gentleman, a scholar, and one who treated his patients (although not necessarily his colleagues!) with the utmost respect. Horsley's surgical results were quite respectable given the times; in addition, the energy he devoted to finding new surgical techniques was remarkable. Horsley had another side to his personality, becoming somewhat of a zealot on alcohol and its abuse. However, being of a rather strident personality, he ignored warnings and entered a hot desert zone with temperatures in excess of 100°F, only to die of heat stroke (or so it is speculated); considering his intellectual genius, one can only guess what other contributions he would have made to neurosurgery. Before his death, he made a
number of remarkable contributions to the field of neurosurgery, and these have been nicely chronicled by Tan and Black.

James T. Goodrich  
Bronx, New York

This article nicely summarizes the available biographical data regarding Victor Horsley, who clearly was one of the great pioneers of neurosurgery. Horsley came along at the right time and had the combination of surgical skill and inquisitive investigational mind that allowed for initial significant progress to be made. As the authors remind us, Horsley set the stage for specialization in surgery of the nervous system in the English-speaking world.

Edward R. Laws, Jr.  
Charlottesville, Virginia

Two more plates from Andreas Bonn’s *Tabulae Ossium Morbosorum, Praecipue Thesauri Hoviani*. Amstelaedami, J.C. Sepp, 1785. (Courtesy, Rare Book Room, Norris Medical Library, Keck School of Medicine, University of Southern California, Los Angeles, California. Also see pp. 525, 577, 588.)